Z + Jets Study
8.4.0 Update
(leading to M_{top} Measurement)

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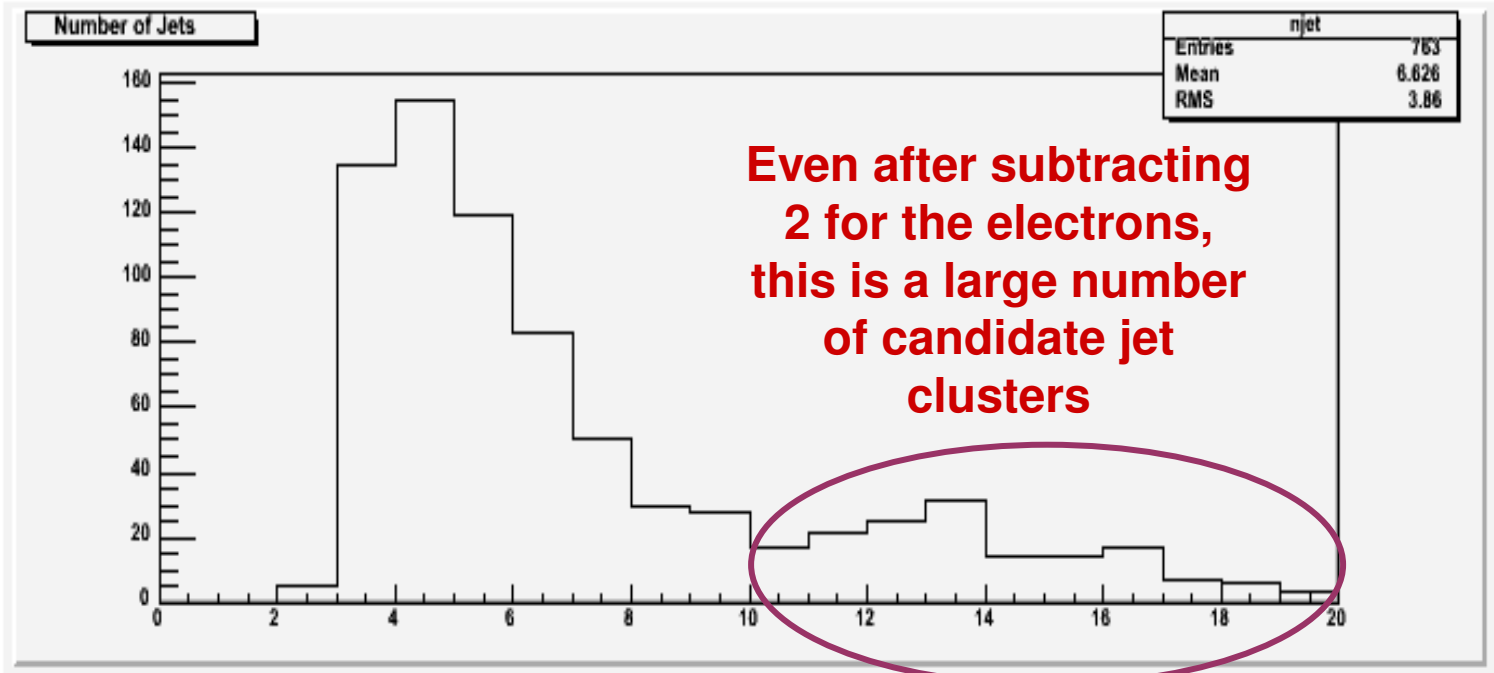
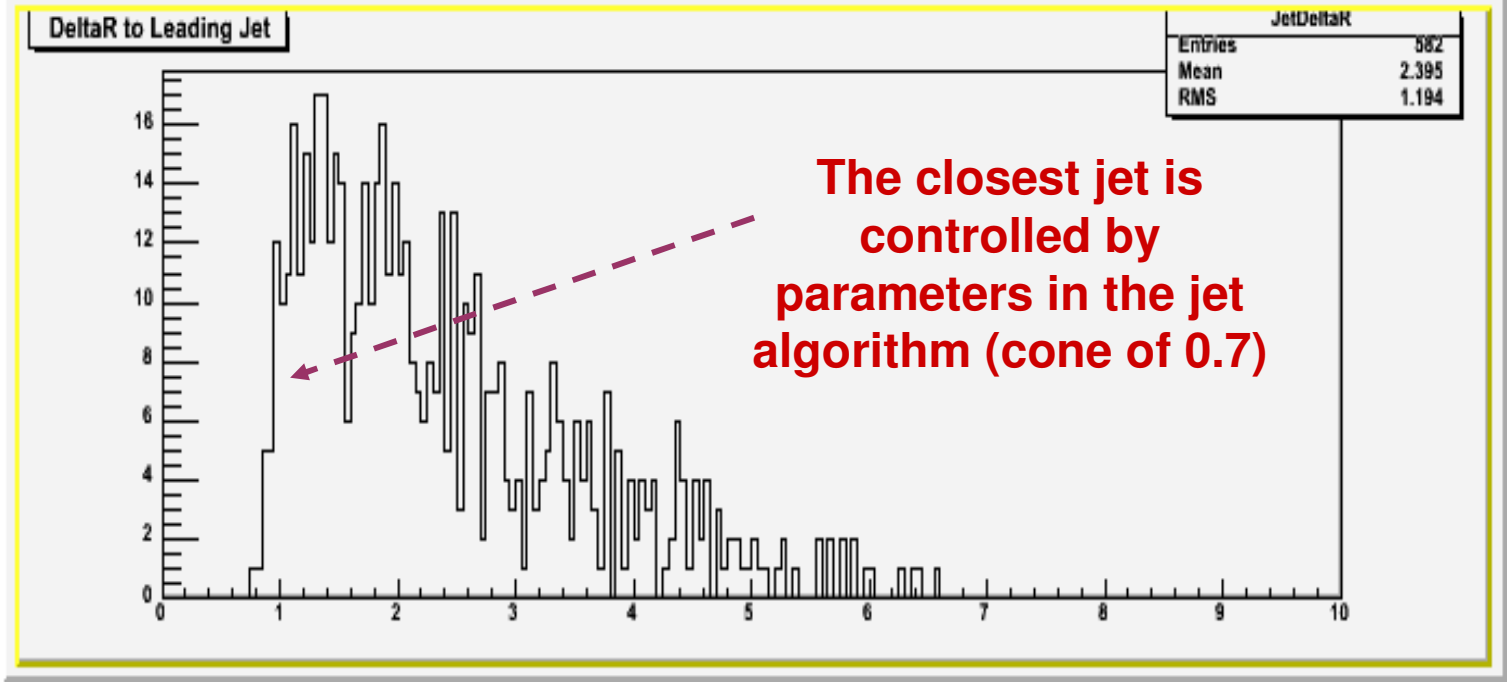
Event Sample

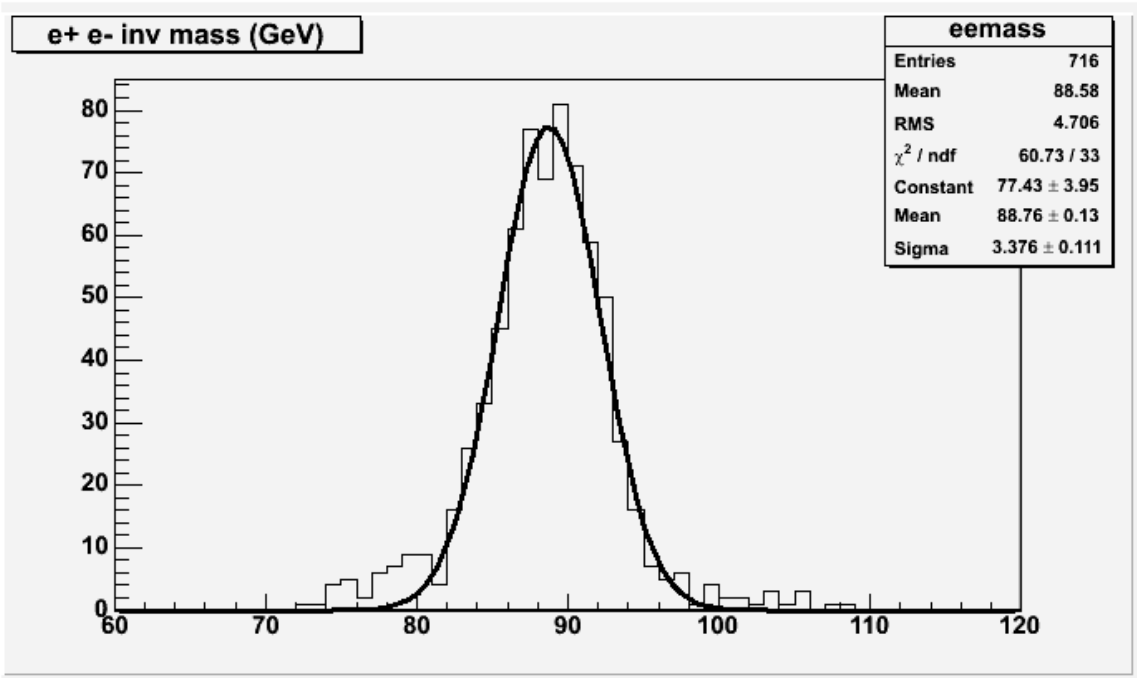
- **Files: /castor/cern.ch/user/a/agupta/zeemm/***
  - **(i.e. DC1 simulation, with 8.4.0 reconstruction)**
- **Selected good electrons**
  - **if(nt.eg_IsEM[i] == 0 && nt.eg_trkmatchnt_X[i] >0)**
  - **0.7< E/p < 1.3**
  - **Required 2 oppositely charged electrons**
- **Mass of electron pair 71.0 < M_{ee} < 111.0 GeV**
- **Gives about 800 events to use to study jet balancing**
- **Use (η,ϕ) match to identify the jets which contain the electrons**

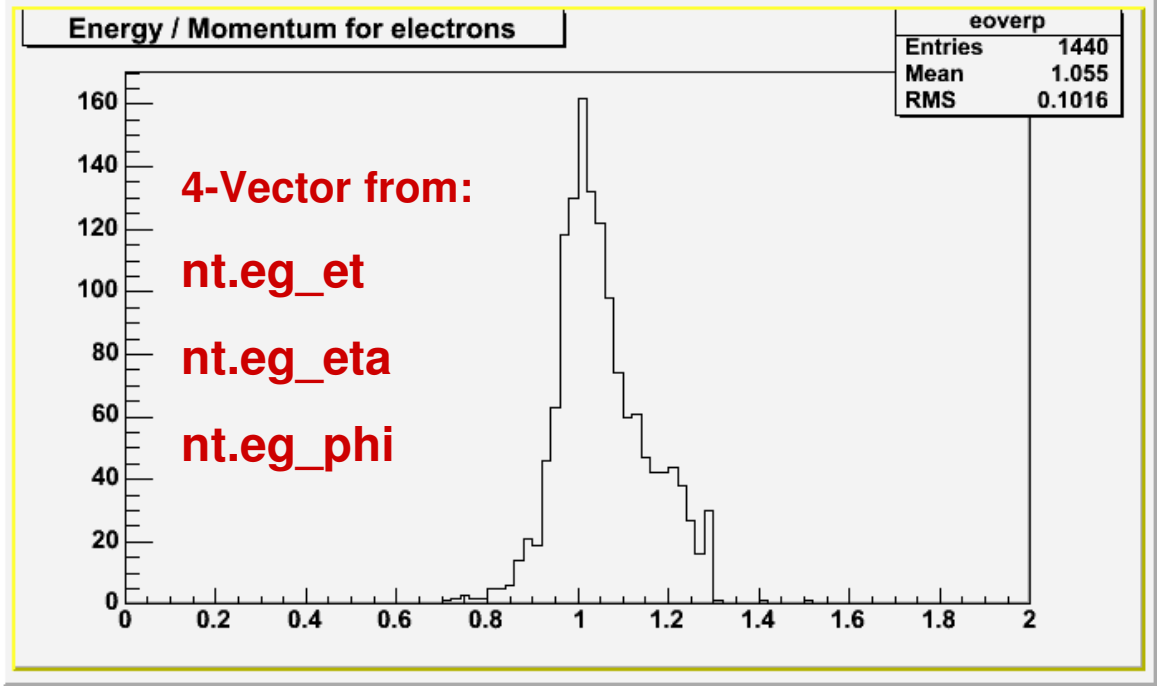
Variables Studied so Far

- Pt(Z)
- Pt(Leading Jet)
- $\Delta\phi$ between reconstructed Z and leading jet
- ΔR between leading jet and closest one in (R,ϕ)
- Et of the closest jet
- M(Z)
- E/p for electrons
- Number of jets in the event


Number of Jets
njet
Entries 753
Mean 6.626
RMS 3.86
Even after subtracting 2 for the electrons, this is a large number of candidate jet clusters


DeltaR to Leading Jet
JetDeltaR
Entries 582
Mean 2.395
RMS 1.194
The closest jet is controlled by parameters in the jet algorithm (cone of 0.7)





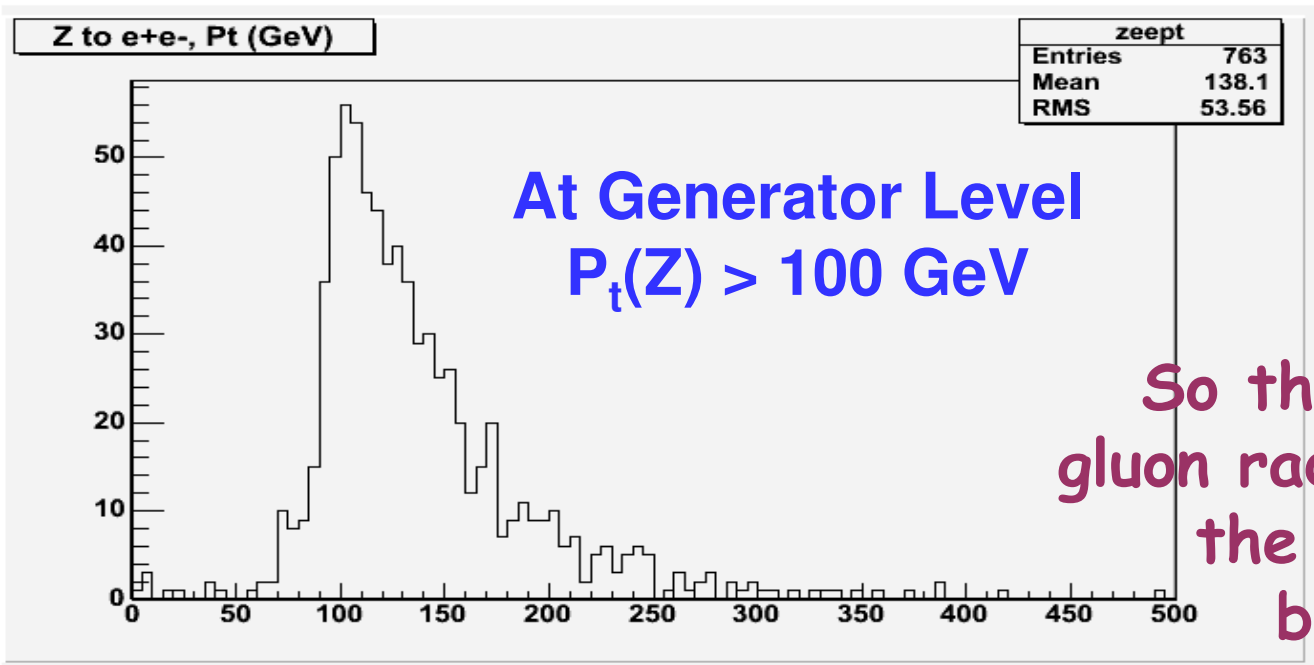
Fitted Zee mass is 88.58GeV

Why is it low?

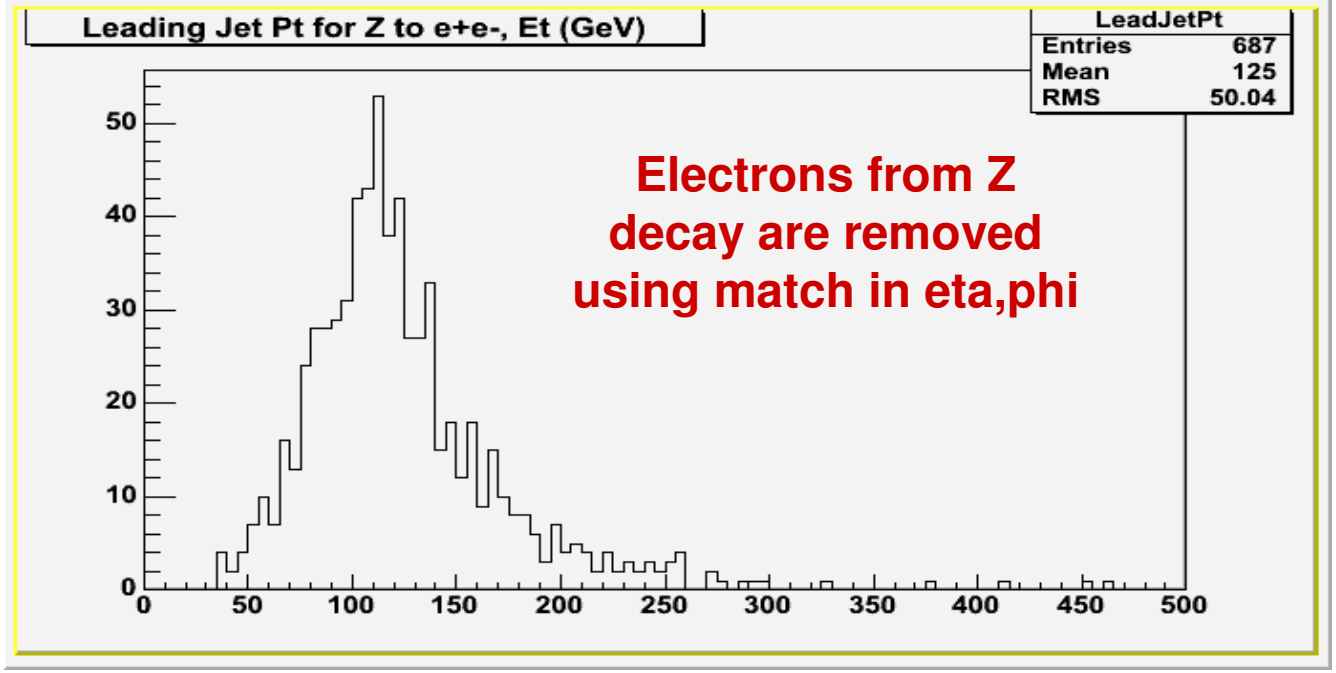
Is it an error in the way I extract the electron 4-vectors from CBNT?

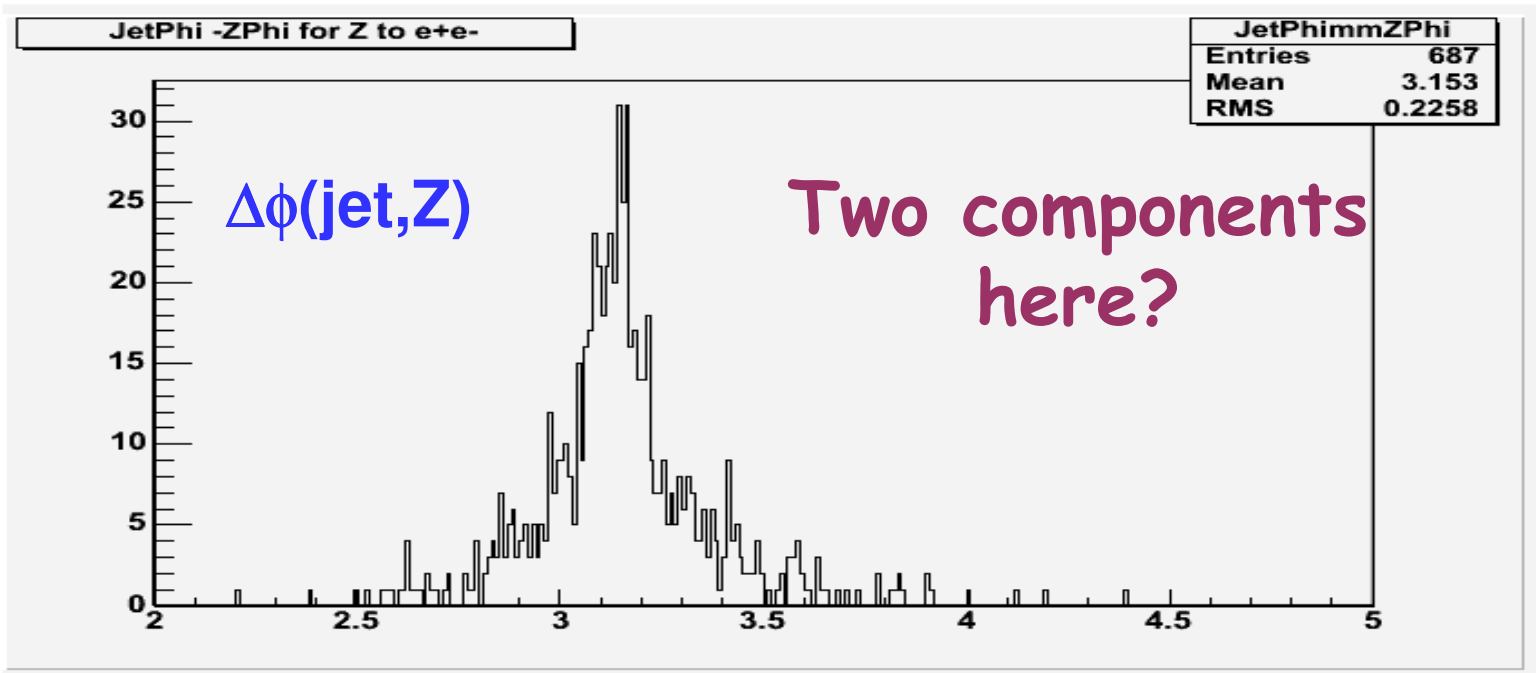
Does it assume a different calibration from that needed to establish the precision EM scale?

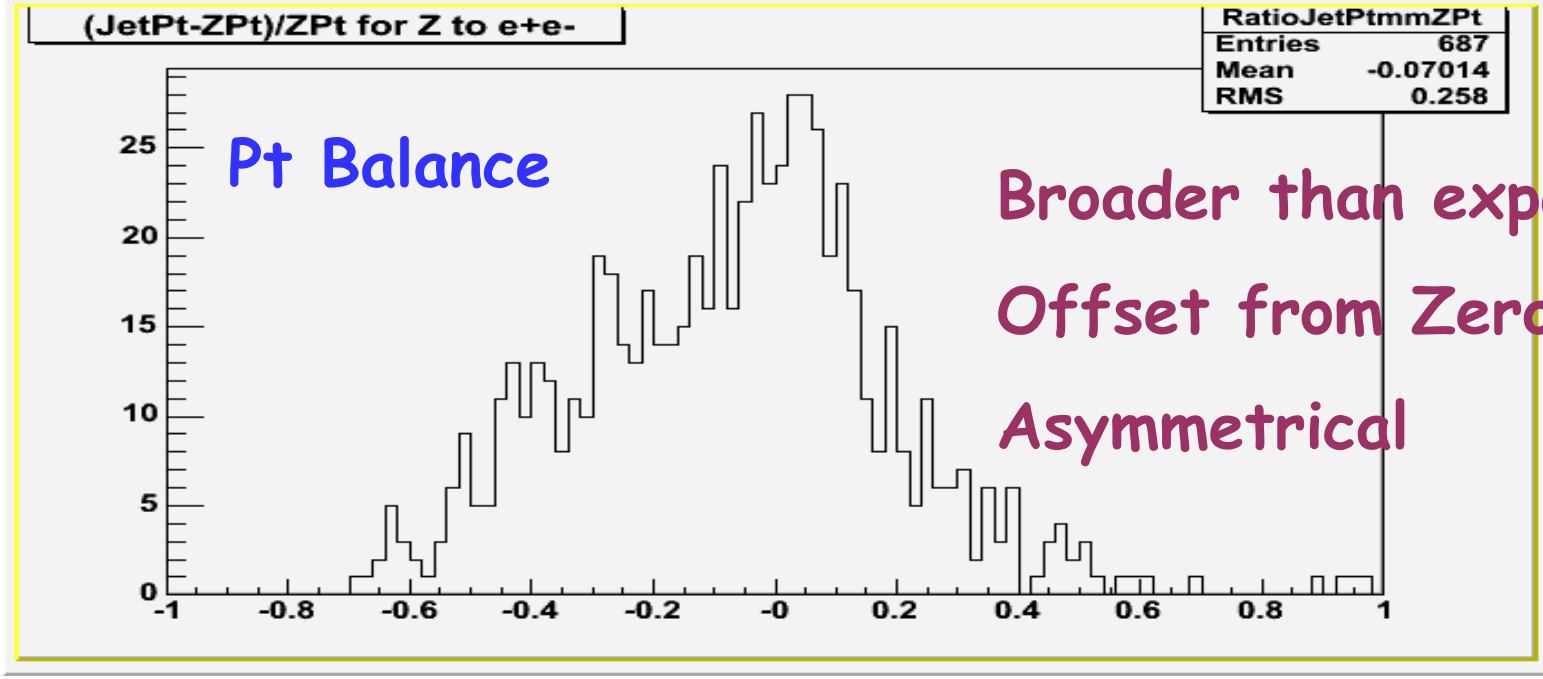
Does it reflect the bremmstrahlung seen in the E/p distribution?

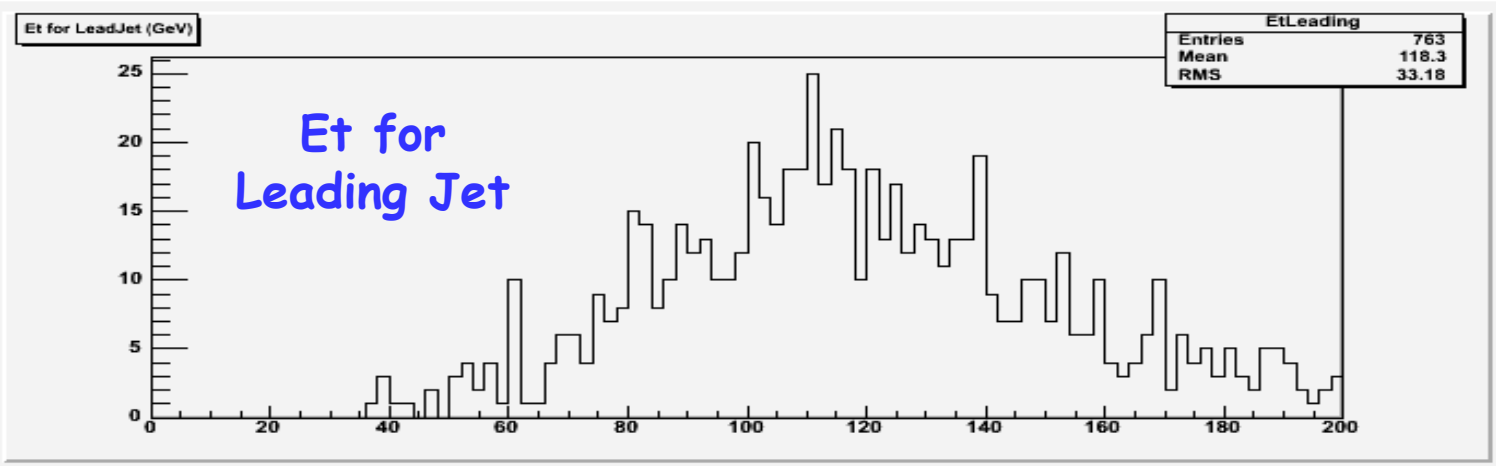


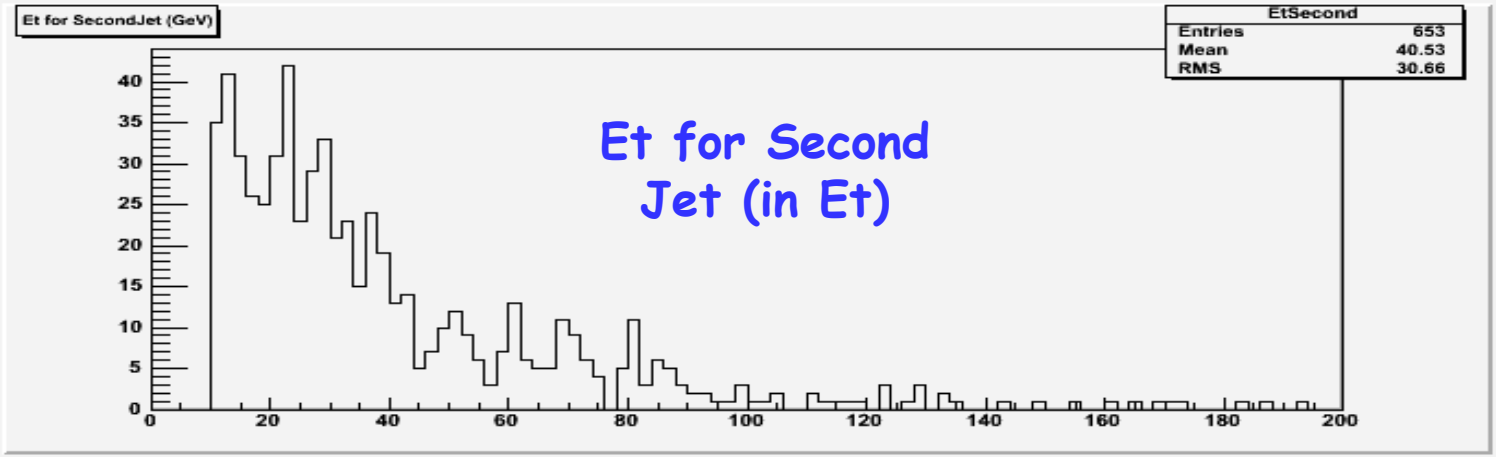
So there is some gluon radiation seen in the threshold behavior

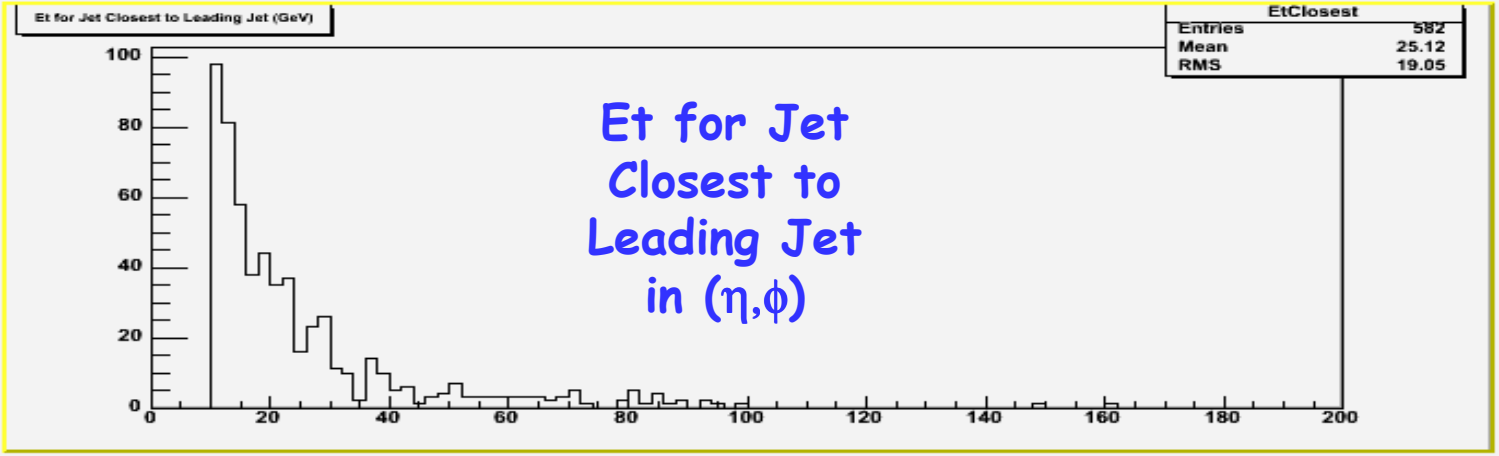


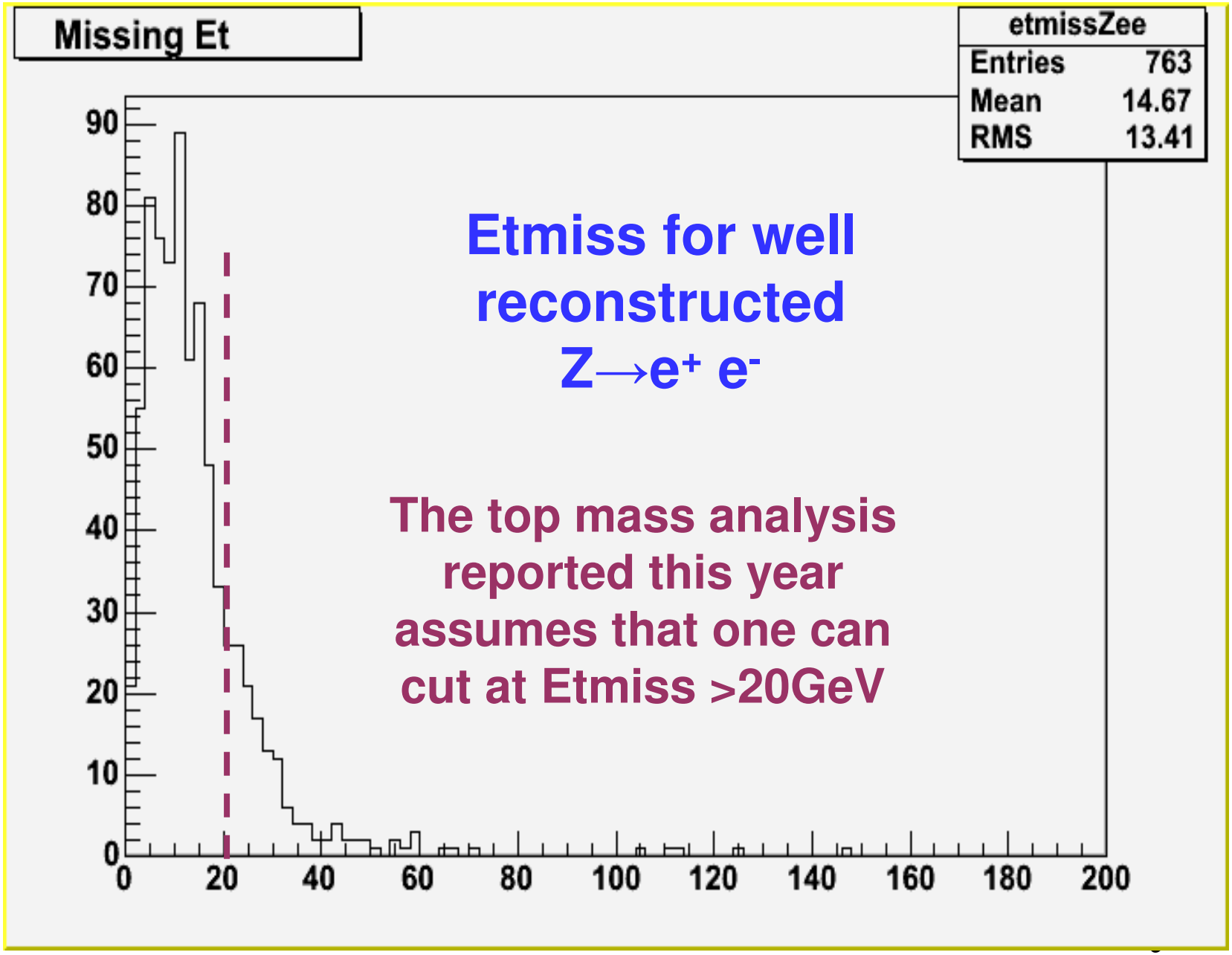

JetPhi -ZPhi for Z to e+e-
JetPhimmZPhi
Entries 687
Mean 3.153
RMS 0.2258
Δφ(jet,Z)
Two components here?


(JetPt-ZPt)/ZPt for Z to e+e-
RatioJetPtmmZPt
Entries 687
Mean -0.07014
RMS 0.258
Pt Balance
Broader than expected?
Offset from Zero
Asymmetrical


Et for LeadJet (GeV)
EtLeading
Entries 763
Mean 118.3
RMS 33.18
Et for Leading Jet


Et for SecondJet (GeV)
EtSecond
Entries 653
Mean 40.53
RMS 30.66
Et for Second Jet (in Et)


Et for Jet Closest to Leading Jet (GeV)
EtClosest
Entries 582
Mean 25.12
RMS 19.05
Et for Jet Closest to Leading Jet in (η,ϕ)


Missing Et
etmissZee
Entries 763
Mean 14.67
RMS 13.41
Etmiss for well reconstructed Z→e+ e-
The top mass analysis reported this year assumes that one can cut at Etmiss >20GeV
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80
100
120
140
160
180
200

Observations & Work in Progress

- Need to better understand the jet Et and multiplicity distributions.
  - Note that almost EVERY event has a second jet with Et>10GeV, and about half have a jet with Et>30GeV
- Why is the Z mass low by ~3%
- Need to go back and verify that I am correctly interpreting the numbers in the CBNT ntuple
- Need to make some appropriate cuts on the second jet and compare my results to those obtained earlier
- Start similar checkout on DC2 files